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COLLEGE OF EDUCATION

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Educational Research Bulletin

An Evaluation of Arithmetic Teaching

R. L. MORTON

ARITHMETIC is in a state of flux; some would say, chaos. Sometimes, I admit, the status of this subject appears chaotic to me; and then I wonder whether the chaos is not in me rather than in the condition of the subject.

Arithmetic, as it appears in the American public school, is a dynamic subject. There is little that is static about it. Much of the instructional material which we used last year is not good enough for this year's pupils. The techniques which we employed a year ago are in many instances out-of-date. Progress is witnessed, too, in the gradation of accepted curricular materials, in the precise placing of units of subject-matter. Confusion is but natural, for the leaders do not always agree as to what is good practice; and the followers, in as far as they know of the differences among the leaders, find decisions difficult to form. This condition, coupled with the fact that the leaders are often misunderstood can hardly be expected to result in a condition of perfect order and harmony.

PRACTICE LAGS BEHIND THEORY

For many of the elements of the arithmetic curriculum teaching techniques based upon the outcomes of scientific investigation can be arranged. Scientific investigation has helped greatly in selecting the curricular materials and in placing them in better positions. Where scientific investigation fails us, educational theory carries us on. These two—scientific investigation and educational theory—enable us to select and organize our curriculum and to decide upon our teaching plans.

Both the scientific study of educational problems and educational theory have made large strides in the present century. Consequently, the best of our present educational practices differ from those of three decades ago almost if not quite so much as the best of today's means of transportation and communication differ from those prevalent at the beginning of the twentieth century. Unfortunately, we do not need to go into the past to trace the development of present practices. The various stages are with us today. Whether one be primarily concerned with the course of study or with methods of teaching, one can find in the schools of Ohio today arithmetical instruction at the 1900 level, the 1910 level, the 1920 level, and the 1929 level of what constitutes or has constituted the most enlightened and the most effective educational procedure.

[1] Paper read before the Elementary Teachers' Section of the Ninth Educational Conference, Ohio State University.

THE MULTIPLICATION "TABLES"

A number of years ago the elements of the four fundamental operations were taught through the use of tables —tables of addition, subtraction, multiplication, and division. Three of these have almost completely disappeared. The fourth, the multiplication tables, are with us still.

The notion seems to prevail in many communities that the best way to learn the multiplication combinations is through the serial memorizing of tables. Frequently, these are taken up in the order of the size of the multipliers, first the ones, then the twos, then the threes, until finally the twelves are reached. The assignment, so conceived, embraces 78 combinations or 144 facts.

There are several objections to this procedure. In the first place, the combinations are not used in this tabular arrangement. When I multiply 46 by 7, I need to know seven sixes and seven fours. I waste time and increase the probability of errors, especially in carrying, if I must think "seven ones are 7, seven twos are 14, seven threes are 21, seven fours are 28, seven fives are 35, seven sixes are 42," in order to react correctly to the seven times six stimulus. We all agree that there must be a more direct association between seven times six and forty-two if we are to be efficient multipliers. If the multiplication combinations are first learned in tables, they must be relearned before they will function effectively in examples in which they occur in a miscellaneous order.

Learning the combinations by tables also fails to take full advantage of the similarity of the two facts for a given combination and of the close relationship between the facts of multiplication and those of division. The best time to learn nine fours seems to be right in the same lesson in which four nines is learned. Likewise, this seems to be the best time to learn the number of fours in thirty-six and the number of nines in thirty-six. Learning these facts by tables, on the other hand, separates widely the learning of $4 \times 9 = 36$ and $9 \times 4 = 36$, and it also fails to indicate the close functional relationship existing between multiplication and division.

Learning tables in serial order, also, usually fails to grade the material in the order of its difficulty. Do you remember how easy it was to learn the ones, the twos, the fives, the tens, and the elevens, excepting 11×11 and 12×11? And do you also remember the struggles of yourself and others when commanded to "say the sevens?" Whatever use we eventually may, or may not, make of the recent studies of the difficulty of multiplication combinations we shall probably not hesitate to admit that children find it easier to remember that two fives are ten, than that seven eights are fifty-six.

The fourth and final objection which I wish to urge against the older plan of memorizing the tables in serial order is the formerly almost universal, and still too prevalent, practice of going to 12×12. David Eugene Smith tells us that this custom was imported from England some three centuries ago and that there it was justified on the ground that since there are twelve pence in a shilling, one should know the number of pence in two shillings, three shillings, etc. The elevens

presumably were included to make the system complete.[2] Since there are 12 things in a dozen and 12 inches in a foot, we certainly need to teach a few twelves, say from 2x12 to 6x12 and adding 12x12 when needed, but we do not need to load them on to pupils struggling with the basic combinations up to 9x9. If we stop with 9x9, we reduce the number of combinations to be learned from 78 to 45. Of the 45, those involving one, two, or five are admittedly easy. This leaves a more difficult group of 21. The wise third- or fourth-grade teacher will center her attention largely on these 21 and will get much better results.

We have here an interesting illustration of several levels of educational progress. Some still have the multiplication tables memorized serially from 1x1 to 12x12. Others have reduced the assignment until it is limited to 9x9 or 10x10 but teach the tables in serial order. A third group departs from the table arrangement, recognizes varying degrees of difficulty among the combinations, and teaches them in a far more efficient manner.

LONG AND SHORT DIVISION

A second interesting and instructive illustration of varying stages of progress in the teaching of arithmetic is found in division with integers. The older, and still prevalent, plan provides that short division shall be taught before long division. Lest I be misunderstood, let me state that when I refer to short and long division I refer to the form in which the work of solving a division example is carried out and not to the size of the divisor. Suppose, for example, that I am dividing 635 by 8. In doing this example by short division I must subtract an invisible 56 from a visible 63, think "how many eights in 75" with only the 5 of the 75 visible, and subtract an invisible 72 from a partially visible 75. This is hard, very hard, for third- and fourth-grade pupils. How much easier it is when all the quantities concerned are set down on paper where they can be seen! At its best, division is difficult for many beginners. Good teaching may not make it easy, but certainly good teaching will make it easier.[3]

Many elementary teachers and their supervisors seem to accept without question the decrees of custom which state that early work in division should be presented in the short form. To be sure, much of the responsibility rests upon the textbook writers who should know better. Teachers blame the textbooks seeming to think that no departures from what is printed therein are proper. They are also wont to state that supervisors and superintendents dictate what their teaching procedures shall be. The supervisors and superintendents tell me, on the other hand, that the typical classroom teacher expects to be told just what to do and how to do it. They insist that teachers with novel ideas of their own are rare and that they would welcome critical suggestions and thought-provoking recommendations. Wherever the responsibility for this ultra-conservative practice may lie, the country

[2] Smith, David Eugene. *The Progress of Arithmetic in the Last Quarter of a Century.* Boston: Ginn and Company, 1923. pp. 43-44.

[3] See also, Morton, R. L. *Teaching Arithmetic in the Primary Grades.* Boston: Silver, Burdett and Company, 1927. pp. 167-69.

needs a generation of classroom teachers who will get abreast and keep abreast of progress in teaching and who will contribute their bit toward the development of better techniques.

We have given but one suggestion of progress in the teaching of division. The good teacher will not only consider thoughtfully the question of long division versus short division, but she will also be concerned with the analysis of division into its component difficulties and with the presentation of a graded series of lessons which will introduce these difficulties one at a time as far as this is possible.

COMMON AND UNCOMMON FRACTIONS

Ten years ago, G. M. Wilson in a survey of the social and business uses of arithmetic discovered that about 96 percent of all the fractions used in problems collected from ordinary social and business practices were included in the list, one-half, one-fourth, three-fourths, one-third, two-thirds, one-eighth, three-eighths, one-fifth, two-fifths, and four-fifths.[4] In view of this fact, questions have been raised regarding the propriety of requiring pupils in the elementary school to add, subtract, multiply, and divide fractions of infrequent occurrence in out-of-school affairs. Of course, we would not limit our instruction in fractions to the list of ten quoted from Wilson. This list includes eighths and fifths, but it does not include five-eighths, seven-eighths, and three-fifths. We would give these as much attention as the other eighths and fifths. Certainly, we should also include one-sixth and five-sixths. Others which occur but which are promptly reduced to lower terms include two-fourths, two-sixths, three-sixths, four-sixths, two-eighths, four-eighths, and six-eighths. In expressing measurements of lengths and diameters in hardware stores and machine shops, we use sixteenths, thirty-seconds, and sometimes sixty-fourths. When we add and subtract fractions, we get tenths, twelfths, fifteenths, twentieths, twenty-fourths, thirtieths, and others which will receive a limited share of our attention. Pupils will have an opportunity to become acquainted with sevenths and ninths when they study the primary facts of division.

We do not know yet just what curricular material should be included for practice in the operations with fractions, but it is good psychology and good sense to approximate, at least, out-of-school business and social practices. Perhaps a significant reason for the deplorable lack of understanding of fractions and the operations with them on the part of seventh-grade pupils who have studied them, as revealed by Schorling and others, lies in the fact that a considerable portion of the practice is provided through the use of examples and problems which are meaningful to neither the teacher nor the pupils.[5]

REAL AND UNREAL PROBLEMS

There is no more striking illustration of levels of educational progress

[4] Wilson, G. M. *A Survey of the Social and Business Uses of Arithmetic.* New York: Teachers College, Columbia University, 1919. 62 pp. Out of print. (Teachers College Columbia University, Contributions to Education No. 100.)

[5] A detailed discussion of the teaching of fractions will be found in Morton, *op. cit.* pp. 108-207.

than in the selection and use of problems. When I speak of problems, I mean arithmetical situations in which one must first decide what operations to perform in contrast to those arithmetical situations in which the operations to be performed are indicated. Problems are sometimes called "word problems," "story problems," or "verbal problems."

There are several criteria of a good problem. The more important may be listed briefly:

1. *Reality.*—Good problems are real. They are such as occur, or at least might occur, in the ordinary experiences of the pupils and those with whom they are associated.
2. *Interest.*—Good problems are interesting. They deal with situations which appeal to children.
3. *Language.*—Good problems are well written. The terms and expressions used are those which the pupils can understand.
4. *Relation to other work.*—Good problems provide opportunities for practicing the techniques which have recently been the object of attention. Space is insufficient for a full discussion of these criteria. We can illustrate defects in problems by a few selections from textbooks, syllabi, and examinations.

There is first that large group of problems whose answers had to be known before the problems could be written. By their very nature, they are unreal. Consider these:

1. Jack has saved \$2.75. His older brother has saved 3 times as much. How much have both saved?

2. Mr. James put 25% of his salary in the bank. If he put \$55 in the bank each month, what is his monthly salary?

3. A train runs 8.5 hours at the rate of 43.5 miles per hour. How far does it run?

4. If 4/5 of my age is 12 years, what is my age?

5. The sum of three numbers is 144. One of the numbers is half as large as the other and the third number is 48. Find each of the two numbers whose relation is given.

6. Our electric light bill for February was \$1.95. For May it was 2/3 as large. What was the bill for May?

No one of these problems would occur outside the schoolroom. We solve problems to find answers to really pertinent questions. We do not solve such artificial concoctions made by one who started with the answers.

The following arithmetical absurdity occurred on a state teachers' examination in Ohio three years ago:

A farmer sold two horses for \$96 each. On one he lost 1/7 of the cost, on the other he gained 1/7 of the cost. (a) How much did he gain or lose by the transaction? (b) What percent did he gain or lose?

A recent eighth-grade examination list contains this:

The interest at 4% for 2 years, 3 months on a certain principal is \$31.50. Find the principal.

In addition to the fact that the principal was known before the interest could be calculated, this problem is unreal since simple interest is ordinarily not allowed to run for two years and three months.

Many problems included in pupils' assignments are unreal in the sense that the last one is—they do not correctly

reflect business and social practices. The same list from which the interest problem was quoted directs the pupil to write a promissory note, giving the amount, the rate, the date, the time, the payee, and the payer. In actual experience, people use printed forms for promissory notes and fill them in as they fill in blank checks.

This printed examination list also contains this problem:

Find the cost of 104 shares of bank stock at 116½, brokerage ½%.

The author of the problem probably never dealt with a broker, or he would know that brokers do not charge such rates.

Consider these problems:

1. John brought 3 books from the library and read 18 pages in each that night. How many pages did he read?

2. I saw 956 Boy Scouts in a parade, 748 of them stood erect. How many were not erect?

3. If a horse trots 9 miles in one hour, how far will he travel in 10 hours?

4. Edmund and his father drove their car 456 miles in 4 days, running the same number of miles each day. How many miles did they run each day?

5. A girl canned 3 quarts of fruit each week day in July in a year in which July had four Sundays. How many quarts did she can?

6. A boy is picking cherries for 4 cents a quart. How much will he receive for picking 2 gallons of cherries?

7. A grocer put 11¾ gallons of molasses into a cask containing 10½ gallons. He sold 6¼ gallons. How many gallons were left in the cask?

8. Ralph takes care of the furnace. Last week he had ⅝ of a ton of coal. Now he has only ¼ of a ton. How much coal has he used?

9. Two automobiles met after one had run for 2¼ hours at 17½ miles per hour and the other for 3 and 2/5 hours at 22½ miles per hour. How far apart were they when they started?

10. A farmer can plow 4 and 2/3 furrows across a field in one hour. How many hours will be required to plow a field if 544 furrows must be plowed?

Some so-called problems, require little or no calculation but are involved verbal statements, presumably testing knowledge of terms and processes:

1. If you divide a circle into equal portions and take a number of these portions, how can you represent this process numerically?

2. What do we call the number that shows the number of fractional units required to make a fraction?

3. In this picture you see one kitten on the ground and one kitten on the stump. If you should ask me how many kittens are on the stump, what would be my answer?

Evidently, the difficulties of these problems are primarily difficulties of language. Even adults find the first and second hard to understand. What is gained by the use of such questions, even if the pupils do understand them, is not clear.

We could almost indefinitely continue to indicate the various levels of educational advancement and suggest an evaluation of present practices in teaching children to solve problems. We have scarcely touched the element of interest and have said nothing about the art of problem-writing. Furthermore, we have not mentioned the technique of solving problems and the various ways of teaching children how to plan and find solutions.

Our purpose, as was stated at the outset, has been to suggest that arithmetic has made great progress in recent years but that every level of advancement of the last thirty years, from that of thirty years ago to that of today, can be found at the present time in our public school. The evaluation which we place upon education in arithmetic in the elementary school, then, depends upon the school; and the school, largely upon the teacher.

Adjectives Used by High-School Students

E. J. ASHBAUGH

FOR SOME time the writer has been interested in a study of non-school use of English by junior and senior high-school students. The following report supplements previous data already published upon this subject.[1] As explained in the first reference, the data were gathered from letters written by students of junior and senior high schools and sent through the mail to their friends.

The following data are based on an analysis of one hundred letters written by girls in each Grade VII to XII inclusive. These letters averaged from 205 words per letter in the seventh grade to 314 words per letter in the twelfth. In each grade the average length was somewhat greater than in the grade preceding.

The sum total of running words in the six hundred letters was 161,640 and included nearly six thousand different words. As has been found in previous counts, a few words with their repetitions make up a very large percentage of the total. In the seventh and eighth grades, nine words with their repetitions make up twenty-five percent of the total running words and in the other four grades, ten words with their repetitions make up a like proportion. Six words, I, to, and, the, you, and a, were among these most used words in all six grades. The other four places are distributed among five words, it, have, we, is, and of. A comparison of the first one hundred words of highest frequency in Horn's *Basic Writing Vocabulary* with the one hundred highest frequency words in the vocabularies used by these junior and senior high-school students reveals eighty percent agreement. Among the words used more frequently in the Horn study were order and received, which are distinctly business words. Other words such as which, by, an, his, make, may, and dear, are less easily explained. However, but three words of the first one hundred in Dr. Horn's study occur beyond the second hundred in this study. In other words, these studies show much more similarity than difference.

Since the use of descriptive adjectives is usually considered especially significant as indicating wealth of vocabulary and richness of description, a special count was made of the descriptive adjectives and the words which they

[1] Ashbaugh, E. J. "Non-School English of High School Students," *Journal of Educational Research*, 15: 307-13, May, 1927, and Ashbaugh, E. J. "The High School Student's Standard of English," *The English Journal*, 17: 630-39, October, 1928.

modify. The number of different descriptive adjectives (the articles, a, an, and the, and definitive adjectives, such as this and that, and numerals and ordinals were omitted) varied from 168 in the seventh-grade letters to 328 in the twelfth-grade letters. The frequency with which these adjectives were used varied from 541 usages in the seventh grade to 1,037 in the twelfth. Single words were used with a frequency within single grades varying from 1 to 70. The adjective good was used seventy times in the one hundred letters by the twelfth-grade writers. The total use of all descriptive adjectives amounted to 5,316 times in these six hundred letters totaling more than 161,000 running words. This means an average of nine adjectives per letter and one adjective to every thirty words.

Eighty-three adjectives were used five or more times by writers in one or more of the different grades. These eighty-three were used a total of 3,229 times in the six hundred letters. Eighty of these eighty-three adjectives were in the positive degree. Better, best, and cutest were the only exceptions. The ten most frequently used adjectives with frequency of usage were as follows: good, 337; last, 257; new, 181; glad, 164; next, 160; nice, 134; big, 115; little, 111; long, 105; fine, 91. It will be noted that four of these indicate quality, three time, and three size or dimension.

Since the word good stood out so preeminently as the adjective most used by these letter writers, an examination was made to discover what substantives had been described by it. The tabulation revealed 140 different substantives modified by the word good. Fourteen of these were plurals, the singulars of which had also been used. The outstanding substantive modified by the word good in these letters was the word time with a frequency of 107 and the word times with ten. For most purposes these would be considered together. In every grade it was the substantive most frequently modified by this adjective and would seem to indicate that children of these ages are enjoying themselves at frequent intervals if not continually. The second substantive in order of frequency of use was picture and pictures, with combined frequencies of twenty-one, grade and grades, with nine, and luck, with eight. One hundred and two of the 140 substantives modified by the word good were used in this connection but once in the six hundred letters studied.

The preponderance of the usage of the adjective good with the noun time suggested that an examination might well be made of the word time to discover whether or not other adjectives were also used with this substantive. The examination revealed the fact that there were fifty-seven other adjectives as well as good used to describe the idea time. Next in order were long, next, wonderful, fine, swell, nice, grand, lovely, and marvelous; each of which was used five times or more. There were also twenty-seven adjectives used once only modifying time.

Since these school children were writing letters to their friends which were to be sent through the mail and consequently not come under the critical eye of the teacher, an analysis was made of the adjectives used to describe

teacher. A total of twenty-nine different adjectives was found, modifying the word teacher and six additional modifying teachers. These adjectives had a total usage of sixty-six times in the six hundred letters. The most frequently used adjective was new with a frequency of fourteen. Twenty-seven of the thirty-five were used only once. It is interesting to note that but seven of these thirty-five adjectives may be considered derogatory. We find, however, the superlative degree, best and worst, applied to teachers.

Since all these letters were written by girls it might be interesting to note the adjectives that are used to modify the pronoun he. It is rather significant that this usage does not occur at all in the one hundred seventh-grade letters but becomes increasingly frequent to the eleventh grade with but a slight drop in the twelfth. Forty-eight different adjectives were used a total of sixty-seven times. The most frequently used descriptive term was cute with a total of six. Thirty-seven of the forty-eight were used only once.

The word letter was also analyzed to ascertain the adjectives which these young people had applied in describing this idea. Many of the words were used to characterize the writer's own letter and most of the remainder were descriptive of the letter received by the writer from the one addressed. A total of fifty-one different adjectives was found to apply to the word letter and ten others to the word letters. The total frequency was 157. The word long had the next, with thirty-four frequency, last, ten, interesting, nine, next, eight, following in the order named. Perhaps last and next should not be included, in which case the number and frequency would be reduced as per the data given.

In studying the adjectives in detail, the writer was impressed with the scarcity of comparative and superlative degree words. Consequently, a complete check was made of all the adjectives used in the six hundred letters to discover what adjectives were used in the comparative and superlative degrees and their frequencies as compared with the usage of the same word in the positive degree. A total of forty-eight adjectives was found in the six-hundred letters to have been used in either the comparative or superlative degree. Three of these were not used in the positive at all. The total frequencies, however, were as follows: positive degree, 1,663; comparative, 80; superlative, 149. Better, best, and cutest were the only forms that were used more than ten times, they having frequencies of thirty-nine, fifty-seven, and fifteen respectively. Worst and highest were each used eight times, latest, six. Other forms had a still lower frequency. These data would indicate that in their letters, at least, these pupils are not greatly given to the use of superlatives.

These data are doubtless open to a variety of interpretations. We are sadly lacking in comparable studies which would enable one to infer the normalcy of this particular group and in standards by which excellence may be judged. The impression of the writer is that neither the total vocabulary nor the descriptive terms justify an inference of poverty of language so often charged against high-school students.

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Larger Classes

FOR a quarter of a century important supervising agencies have stipulated the maximum size of class as one of the requirements for the accrediting of schools and colleges. The number—twenty-five or thirty students per class—has been set by consensus on the assumption that the smaller the class the greater the amount of individual attention that can be given to students.

Within the last ten years a great number of objectively controlled experiments have demonstrated the fact that, according to the tests administered in the experiments, the size of a class is a matter of little importance. Classes numbering fifty, and in some cases as high as one hundred and seventy students, have an average score as high as those containing only twenty-five or thirty members. These objective data are being used in a rapidly increasing number of cases by administrators concerned with the pupil-cost of instruction to increase the size of classes.

Thoughtful critics do not accept the data at their face values. They attack the findings from two sides. They claim, in the first place, that the objective tests which have been given directly test little except information. They open the whole question of the outcomes of teaching. They say that education develops the ability to think and reason more closely. They assert that it teaches and perfects operations involving skill. They assert that it influences behavior, and they claim that it does something to change points of view toward life and attitudes toward values and objectives. These outcomes, they believe, are not tested in any valid degree by the measures which have been used in reaching the conclusions concerning the importance of class-size. They claim, also, that there is something to be gained from direct personal contacts. They recognize, of course, that there may be little more personal contact between instructors and pupils in small classes than in large groups; but they claim that it would be impossible for those teachers who do make much of personal contacts to understand and know their students well if the classes are extremely large.

In the opinion of the writer, the objections of these thoughtful critics should be taken seriously by administrators before they accept the findings in favor of large classes as a basis for wholesale increase in the teaching load.

W. W. C.

New Appointments

THE ORGANIZATION of the Bureau of Educational Research, Ohio State University was slightly modified during the summer of 1929. The readers of the Bulletin are probably aware of the fact that the Bureau has been organized in five divisions: Reference, Edi-

torial, Appointments, School Surveys, and School Administration. The resignation of the Assistant Director, E. J. Ashbaugh, to become Dean of the College of Education at Miami University has resulted in the temporary elimination of the School-Administration Division. To these five divisions have been added two units: the University-Personnel Division and the University-Curriculum Division.

During last year Miss L. Belle Voegelein, the well-known head of the Reference Division, resigned to organize the new *Educational Index* published by H. W. Wilson and Company, following the subject index compiled by her two years ago in *List of Educational Subject Headings*. Miss Mary Rebecca Lingenfelter has been appointed to succeed Miss Voegelein. Miss Lingenfelter received her library certificate from Drexel Institute and her degree, Bachelor of Science in Education, from the University of Pennsylvania. She has had a varied experience as cataloguer in libraries in the neighborhood of Philadelphia and has had her chief experience as librarian in several of the army and navy hospitals. More recently she has been a lecturer on library methods in the Summer School, Johns Hopkins University. Miss Lingenfelter assumed her duties on September 1.

During the year T. C. Holy has been making a large number of school surveys for the school districts of Ohio and has been interested for the major part of his time in assisting the Department of Public Instruction in its program for reallocating school districts and school buildings in the equalization counties of the State.

Mr. Anderson of the Appointments Division has centered his research program around a study of demand and supply of teachers for the State. His purpose is to develop techniques whereby an annual study of this kind can be a part of the regular procedure of the State Department of Public Instruction.

In the Editorial Division, Miss Josephine MacLatchy has had major responsibilty for the publication of the *Educational Research Bulletin* and is now assisting in the organization of the new *Journal of Higher Education*, which Ohio State University is preparing to publish, beginning January, 1930.

The comprehensive program of President Rightmire, looking to the improvement of personnel contacts and matters of instruction within the University, has led the Bureau to expand that phase of its works. A University-Personnel Unit is to be established which will primarily during its early years assist the junior deans in the collection of data useful to them in the performance of their duties. This new unit within the Bureau will be under the direction of William Harold Cowley who has, for the last two years, been executive secretary of the Board of Vocational Guidance and Placement, at the University of Chicago.

To assist the Director in the study of curriculum projects of the University, a Division of University Curriculum has been added to the Bureau under the direction of Edgar Dale, who recently received his doctorate at the University of Chicago, and who for the past year has had charge of the curricular studies of the Eastman Teaching Films, Incorporated.

To succeed Dr. Ashbaugh and to take charge of the Division of Accomplishment Tests, Ralph Winfred Tyler has been called from the University of North Carolina. Mr. Tyler formerly was instructor in the University of Nebraska and for the last three years has been Professor of Education in the University of North Carolina.

The Bureau now consists of seven major divisions, and is probably as well equipped for research work as any similar bureau in the country.

A Survey of Pre-School and Parental Education

JESSIE ALLEN CHARTERS

The editor of this yearbook,[1] Dr. Lois Hayden Meek, and the associate contributors have produced a volume of encyclopedic scope and content. Its purpose, as stated in the Introduction, is to "bring to educators and others interested a survey of the fields of pre-school and parental education." These two fields are considered as so correlated and integrated that it is impossible to survey one without the other, hence the incorporation into one volume of materials which might conceivably have been presented separately to the greater enlightenment of the "educators and others interested."

While the movements for pre-school education and for parental education have recently come to have an interlocking directorate, their origins have been synchronous, not synonymous, as implied in the chapter entitled "History of the Movement." This is clearly indicated in the history of the Chicago Co-operative Nursery School.

In 1915 a small group of wives of faculty members of the University of Chicago organized a co-operative nursery for the care of their young children. The aim of this original group of seven was to offer an opportunity for wholesome play for their children, to give the mothers certain hours of leisure from child care, and to try the social venture of co-operation of mothers in child care. Incidentally, it afforded an excellent opportunity for learning to understand their own children better.

The nursery-school movement does unquestionably focus attention—of educators, and of parents, also—upon the need for better trained parents; it does provide training for children and demonstration to a few parents; it does furnish experimental information and scientific data about children's behavior if the school is organized to keep records and employs the requisite staff of scientists. But it is rare to find a person or a staff equipped by training and experience to observe pre-school children scientifically; to record these observations usably; to teach the children acceptably; to try out teaching experiments effectively; to demonstrate to an observation group intelligibly; and to make the transfer of all the nursery-school laboratory subject-matter from the research form to the curricular form necessary for parents. The philosophies underlying pre-school education and parental education are radically different; the activities—teaching processes and curricula—growing out of these philosophies should be radically different. Whether they actually are as reported in the sur-

[1] *Pre-School and Parental Education. Twenty-Eighth Yearbook of the National Society for the Study of Education.* Bloomington, Illinois: Pub-School Publishing Company, 1929. x + 875 pp.

veys of this yearbook is left to the reader's critical judgment.

In the surveys pre-parental training is incorporated as a part of the programs reported, for parental and pre-parental subject-matters have much in common. At the present time, most of the books available must be used in both fields, consequently there is an obvious, if not fundamental, reason for including the pre-parental courses. And from the point of view of a curriculum-maker, the final purposes of these two curricula are the same—the education of the ones who are to be the parents of the race.

The yearbook is divided into two parts: "Organization and Development" and "Research and Method." In Part I a rather monumental task has been undertaken. As many facts as possible have been recorded about history of the movement, education for pre-school children, provisions for parental and pre-parental education, and professional training of leaders. For movements so new it is difficult to realize the number and extent of the facts recorded. Day nurseries, clinics, nursery schools, and kindergartens have contributed materials, and observations about these matters are given without undue prejudice or partiality. Perhaps we might enjoy the content more if it had been presented in a dramatic rather than an encyclopedic style, but that is not the way of yearbooks and scientists.

In Part II, the review of the numerous studies accomplished or under way in motor development, in language development, and in intellectual, emotional, social, and physical growth gives a specialist in the field of curriculum making a real hope that eventually we will know how to train children and have something closer to fact and further from fiction and tradition to teach their parents.

Only William James could organize 831 pages of information about pre-school and parental education in such a way as to satisfy the literary instinct—if there is one. The editors of the book in hand have collected and displayed much extremely valuable material. Their reticence about persons and places somewhat invalidates the book for handy use by experts in the field, who will be the readers. However, here again they are but following their tradition.

How Much Number Do Children Know?[1]

B. R. BUCKINGHAM

THE AMERICAN school is uncertain regarding the teaching of number in the kindergarten and in the first two grades. Some authorities say teach number in the first grade as a regular prescription; others say wait until the second grade; and a few would wait until the third grade. A distinction is ordinarily made between what is called formal and informal teaching. It is impossible to be sure what this means. It is proper to ask whether there is any grade in which formal, in

[1] An address given before the Kindergarten Section of the Ohio State Educational Conference and included in the printed proceedings.

the sense of formalized, instruction is appropriate.

It is clear to me that if we can decide what we want our teachers to do and where we want them to begin to subject the child to number experiences, to the end that they may learn about quantitative matters, we shall then want to have the work at that point definitely provided for.

You and I know that if we want something done, we must plan for it and provide for it. We want our teachers to know what is expected in the way of learning numbers. We think they are entitled to this; and so do they. But whether they secure the desired effect by what we please to call formal or informal treatment is itself relatively immaterial.

The question of number learning in the early stages depends in part on the so-called law of readiness. Of course, there are those who contend that reading in the first grade is so important that number work should not be begun, even though the child may be ready for it, lest it interfere with reading. It is true that reading is of first importance, but it is entirely possible to make the reading of the first grade so continuous and unrelieved as to pass beyond the point of diminishing returns. Accordingly, the law of readiness offers an important, though not necessarily final, standard by which one may determine when to introduce the teaching of a number. The main question in this connection is whether the child's maturity, his outlook upon life, and his interest in his environment are such as to make him need the learning of number in order to make his life more meaningful.

A strong suggestion regarding the answer to this question is to be found in the extent to which children prior to entering school have already acquired a knowledge of number. If at the age of six, when he enters school, the pupil has passed beyond the period of looking at the picture and counting the boys who are standing or telling the number of pink rabbits, if he has a functional grasp of small numbers, and if he can already enter into communication with other children and with adults on the basis of a common knowledge of small quantities, then the indications are that he is ready for our ministrations, and that to delay the teaching of number to him is to retard his growth.

What number then does the six-year-old child know when he enters the first grade? It is to the answer to this question that we shall now address ourselves.

During the summer of 1928, Miss Josephine MacLatchy, of the Ohio State Bureau of Educational Research, and I brought to completion an interview test, the purpose of which was to measure certain aspects of the number knowledge of young children. This examination was divided into six subtests, the first two of which concerned themselves with counting, the next two, with number concepts, and the last two with number combinations.

It is painfully evident that this is not all that might be desired in testing the number abilities of young children. There is nothing here about comparison, nothing about quantitative vocabulary, nothing about fractions, nothing about measurement. The job, however, which the teacher had to do in

giving the test as it stood was already exacting. More would have been an imposition. Some time, when occasion serves, richer data may be secured. Meanwhile I, for my part, am grateful for what I have received.

The returns upon which this report is based were obtained from the following cities of Ohio: Akron, Cleveland Heights, Hamilton, Kent, Lakewood, Lima, Marietta, Portsmouth, Toledo, and Upper Arlington. Returns were likewise received from Port Arthur, Texas. Several village schools of Franklin and Fairfield Counties also co-operated. In addition to the records from these cities and villages a few were also obtained from rural districts, and, since this report was drawn up, I have received very voluminous data from Cincinnati and a promise of data, somewhat differently derived but of an analogous character, from Cleveland.

All the testing was done before any number work had been taught. In nearly all cases the children were interviewed during the first two weeks of school. Only first-grade children who had entered school at the opening of the semester in September, 1928, were given these tests. Moreover, except in the case of Cincinnati, the teachers excluded from consideration all children except those whose ages were between six and six and a half. At Cincinnati, owing to the desire of the local officials for complete reurns for their own use, each first-grade teacher interviewed all her pupils.[2] The Cincinnati returns, however, are not included in this report because complete tabulations have not yet been finished.

In the school districts other than Cincinnati, where the first-grade teachers selected their pupils on the basis of age the method of selection was as follows. The teacher first arranged all her pupils in alphabetical order, according to the last names. Then, beginning at the top of the list, she selected the first six pupils whose birthdays were between March 1 and September 1, 1922, and who were entering Grade I for the first time. These six pupils were the ones to be tested. If, however, the teacher was willing to test more than six pupils, she simply moved further down the list, taking each pupil, without skipping any names, who qualified as to date of birth and first entrance into Grade I as just described.

The first test called for rote counting by ones and by tens, each child being given two trials. The second test gave two trials in the counting of twenty small objects. They were put in front of the child, and he was required to count them, pointing to them or moving them with his hand as he did so.

The third test was a test in reproducing numbers. The teacher sitting at the table with the child opposite her and with fifteen or twenty small objects, such as cubes or beads or buttons, between them, asked such questions as this, "Give me five pennies." The fourth test required the identification and naming of numbers. The examiner, after throwing down in front of the child a certain number of small objects, asked questions in this form: "How many pennies are there here?"

[2] A summary of the returns from the first-grade pupils of Cincinnati will be given in the report of this study which is to appear in the next Yearbook of the National Society for the Study of Education.

The fifth exercise tested the child's knowledge of the addition combinations like five and two in verbal problems of this type, "If you had five marbles and bought two more, how many marbles would you have then?" Test six was likewise a test on combinations, but this time not in verbal problems but with objects.

The total number of children represented in the testing was 1,356, but the number of usable reports varied with different subtests from 1,121 to 1,356. This, as I said, does not include the returns from Cincinnati.

Counting.—When the children are asked to do rote counting by ones, they being six years of age and not yet taught any number in school, 90 percent of them, assuming that these children are typical, can count to ten, and 60 percent of them to 20. The median child can count to 27 or 28; and one in eight can count to a hundred.

Rote counting by tens is more difficult, yet half of the children were able to understand this direction and to count as far as 40. One quarter of them went all the way to a hundred. A little over a quarter of them could not count by tens at all.

Rote counting may be one thing and counting of objects may be entirely different. It has been argued that the child may say, "one, two, three, four, five, six," without having any notion of what he is doing. It was as a partial check upon this that the test of counting objects was made.

The children were able to do this practically as well as they could count by rote. The average child did all that this test required and obtained a perfect grade upon it. The task was to count twenty objects; more than half of the children succeeded in doing it; and 75 percent of them counted objects at least as far as 14.

Here is an interesting confirmation of the appropriateness of items in the Binet test. You will recall that the counting of thirteen pennies is one of the items at the six-year level. Our results support this item and exhibit the sagacity of the authors of the test.

Number ideas.—The next test, as I have said, called for the reproduction of numbers, that is for a correct response to such questions as, "Give me five pennies." On each number the children were given three trials. In all our tests however, where two or more trials were given, the trials were never consecutive. If a child counted by rote, he did not then do it over again, but he had at least one other test in between. The result was that these children, while they did somewhat better on their second and third trials, did not do conspicuously better.

In reproduction of numbers the following statements may be made. Practically all children were able to reproduce the numbers from one to four. On the number five, 85 percent succeeded at least once out of three trials, 70 percent succeeded twice out of three trials, while nearly two-thirds of the children succeeded every time. The numbers six and seven are about equally difficult and are appreciably, though not markedly harder than five. Eighty percent of the children got six and seven right at least once, 65 percent at least twice, and 55 percent three times. The numbers eight and ten—we did not test nine—were likewise about equally difficult and perceptibly harder than six

and seven. Yet even here three-fourths of the children succeeded at least once in giving the teacher the requested number of objects, and half of them were uniformly successful.

The reproduction of a number in answer to a question similar to "Give me five" by no means shows a complete concept of that number. To know five is much more than to be able to make up a group containing five objects.

There are various other factors that enter into the question, but one of them is the ability to identify an unnamed number and to name it. This is just a little harder than it is to reproduce numbers. Children did not succeed quite as well in the naming test as they did in the reproduction test. The difference was small, but it was consistent, being from four to six percent. Yet even here on the most difficult test of number concepts the children did too well to justify the infantilism of some of our courses of study and textbooks. Forty-two percent of them succeeded every time on the hardest number, namely, the number ten. An additional 28 percent showed that they were on the way to full competency by succeeding either once or twice. Thus a total of 70 percent of these children suceeded at least once on the harder type of test, and on the hardest number. Of course, the number of pupils who succeeded in naming the other numbers was greater.

A diagnosis at the beginning of the first grade is indicated here. Let us teach those that need to learn. The rest will not forget their knowledge of these numbers while we are doing so for the simple reason that they got them in life itself, and life itself will continue to take care of them. They are not a school product.

Combinations.—My final point has to do with number combinations, which I suppose are thought of as distinctly the work of the school. When these combinations were inserted in verbal problems, we found the children were able to give a pretty good account of themselves. How they were able to, how they "got that way," in other words, I, for my part, do not pretend to know.

The ten addition combinations used in this test ranged in difficulty by approximately equal steps from eleventh to eighty-first according to the determination by Knight and Behrens.[3] These combinations were put in verbal problems. The children responded to these verbal problems with percents correct out of 1,356 children varying from 72 percent correct for the combination five plus one to 22 percent correct for the combination four plus five. Some children got every combination right. In fact 91 of them did so. Nearly half the children got five combinations right—the median was 4.7.

The final test of the series presented ten addition combinations with objects. These combinations were selected on the basis of their difficulty. They ranked from tenth to eighty-eighth according to the findings of Knight and Behrens. The method of administering the test was as follows.

In presenting "two plus four" the examiner first lays down two cubes in front of the child and asks him how many there are. He may count them

[3] Knight, F. B., and Behrens, M. S. *Learning of the 100 Addition Combinations and the 100 Subtraction Combinations.* New York: Longmans, Green and Company, 1928. pp. 17-20.

if he wishes. Then the two objects are concealed from his view. Four more of the same kind of objects are now shown to him, and he is asked how many there are. Then those four are likewise concealed along with the first two. Finally, the question is asked, "How many then are two and four?" You will notice that the objects are now out of sight. Hence we call this *invisible addition*.

Those children who were not able to give the right answer were then given a chance to give the right answer by seeing the objects. In other words, if a pupil could not say "six" in answer to this question, the screen was removed, and he was then asked the question, "Now, can you tell me how many two cubes and four cubes are?"

The children varied in their ability to do the *invisible* addition from two-thirds of them who got two and two right to one-third of them who got four plus six right. Half the children got five combinations correct (median 5.0).

As to the *visible* addition, on every combination more than half of these children who had failed on the invisible addition now succeeded. The total of those who were able to negotiate the combinations when presented with objects, either invisible or visible, on no combination amounted to less than 68 percent of the children, and varied upward from that figure as high as 89 percent for the easiest combination.

Thus, the 1,356 children who entered Grade I in these cities last September were able to give a surprisingly good account of themselves. As to how they got what they got, this report has nothing to say. Sixty percent of them had overcome what I should estimate to be quite 90 percent of the difficulty in counting, because they could count through twenty. Most of them could count equally as well with objects, and one quarter of the entire number knew the series of decades to one hundred. Approximately half of the children had uniform success in reproducing even the hardest numbers up to ten and an additional 25 percent were on the way, as shown by ability to answer correctly at least once out of the three trials. Quite 40 percent of the children were successful without exception on identifying and naming the hardest of the numbers. Here again an additional 25 percent showed that their ability in this function was already pretty well formed by succeeding once or twice in three trials.

Finally, on addition combinations ranging in difficulty up to the eighty-first in one test and to the eighty-eighth in another, these children showed a surprising ability, an ability which no school so far as I am aware assumes to exist. It is customary to teach all these combinations impartially to all the children. And yet unless the children whom we have tested are far from typical, nearly 50 percent of six-year-olds already know half the combinations when they enter the first grade. A considerable number of them know all of the combinations used in this test, while, with the assistance of objects they may be expected to succeed to an even greater degree. In the light of these facts it is difficult for me to believe that children on entering Grade I are not "ready" for the teaching of number.

Educational Readings

CHARTERS, W. W. "The Technique of Determining Content of Student-Teaching Courses," *Educational Administration and Supervision*, 15:343-49, May, 1929.

A comparison of duties performed by students in teacher-training courses checked against the list of duties found most important in the Commonwealth Study will bring to light those duties and activities omitted or comparatively slightly stressed in the curricula concerned. These duties and activities should then either be added, increasingly stressed, or the status quo justified.

Traits ranked high in the teacher-training study should be developed wherever possible. Difficulties in the development of desirable traits and in training for specific duties are clearly noted.

HUNT, THELMA. "Measuring Teaching Aptitude," *Educational Administration and Supervision*, 15:334-42, May, 1929.

The Teaching Aptitude Test of the George Washington University series is described in this article. Five general phases of teaching aptitudes are: (1) ability to recognize attitudes, states of mind, or emotions in others; (2) comprehension of teaching situations and judgment in solving them; (3) comprehension and retention of material read; (4) a fund of information relevant to teaching; and (5) ability to observe the details of a situation.

Correlations between test scores and grades in training courses were from .50 to .54; between test results and efficiency ratings of teachers on-the-job, .30 to .50. Higher figures were found for teachers in city schools than those in country schools. There is little evidence given that these tests really predict teaching ability, and the data presented do not justify the selection of teacher-training students on the basis of results of these tests.

BUSWELL, GUY THOMAS. "Summary of Arithmetic Investigations (1928), I and II," *Elementary School Journal*, 29:691-98 and 737-47, May and June, 1929.

Each year since 1925 Dr. Buswell has presented excellent summaries of arithmetic investigations made during the preceding calendar year. "An effort has been made to select only those studies for the summaries which are either quantitative or critical in character. Purely opinioned discussions and reports of merely local interest are not included. However, where difference in judgment might exist, the writer has probably been too liberal rather than too strict in application of the standard of selection."

The summaries are made both alphabetically as to author, and under the general headings of "Methods of Teaching," "Drill," "Problem-Solving," "Diagnostic and Remedial Studies," "The Curriculum," "Tests and Measurements," and "Miscellaneous." This summary makes it easy for one within a short space of time to get a picture of the work done in this field during the year.

SELKE, ERICH. "A Study of the Vocabulary of Ten Spellers," *Elementary School Journal*, 29:767-70, June, 1929.

The vocabularies of ten recent spellers showed rather surprising differences when one considers that most modern texts in spelling are presumably recognized in line with recent investigations in this field. Mr. Selke found that there were 8,427 words in the spellers, of which only 1,080, or 13 percent, were common to all, and 2,350, or 28 percent, were found in only one of the spellers. The number of words ranges from 2,708 to 4,845. "Of the 1,080 different words common to all ten textbooks, only three are located in the same grade by the ten books.... Two-thirds of the words common to all ten spellers are placed in two or three successive grades. There is little agreement, however, as to the placement of the remaining one-third of the words."

REAVIS, WILLIAM C. "Items of Information Collected by Departments of Public Instruction of Ten Representative States," *Elementary School Journal*, 29:666-73, May, 1929.

"This study of the forms used by the departments of public instruction of ten representative states in collecting data annually regarding their schools shows that at present no single item of information is collected by all the states. The information collected by the different states varies widely. Some of the forms include details of no educational significance either locally or nationally; others appear to have undergone critical revision in parts; still others show evidence throughout of a careful effort to delete the unimportant and to collect from the schools only information of vital importance." The author recommends a standardization of forms with supplementary forms for items used only locally, and that such facts be collected and distributed in comparable form for all states by some national organization.

PEIK, W. E. "The Relative Professional Training Value to Beginning Secondary Teachers of Certain Types of Content in Education," *Educational Administration and Supervision*, 15: 321-33, May, 1929.

Nine courses prescribed for the high-school teacher's certificate in Minnesota were ranked by one hundred graduates of the University of Minnesota who had taken these courses between 1923-28. The two procedures used were:

1. The ranking of courses on three bases, namely, (a) direct helpfulness in actual classroom teaching; (b) helpfulness in educational thinking; and (c) general, all-around, professional value.

2. The actual topics found in these nine courses were ranked as to direct value in teaching, and direct or indirect helpfulness in educational thinking.

The rankings of the topics found in each course were combined into a course ranking. There was close agreement between the rankings on the basis of practical value, all-around value, and topical rankings. Practice Teaching, General Methods, and Educational Psychology stood highest.

The major worth of this study is in the ranking of course values on the basis of topics included. The topical-ranking method may unduly weight value of certain topics because of their having been offered in several courses. These topics may also have been covered in elective courses. Median years of experience of the graduates whose rankings were used is not given. Whether the median experience was one year or five might make some difference on the values given certain courses. The number of years required in each course should also be a factor in determining its value.

IN PAPER COVERS

WILLIAMS, LEWIS W. *Supply and Demand as Applied to High-School Teachers.* Urbana, Illinois, University of Illinois, 1929. 11 pp. (University of Illinois Bulletin, Vol. xxvi, No. 26)

Is there an oversupply of high-school teachers? Mr. Williams, who for more than ten years has been in charge of the appointment bureau at the University of Illinois, definitely answers, "Yes." In 1920 more than 96 percent of those registering with the Appointments Office at the University of Illinois secured positions. In 1928 only two-thirds of the registrants were placed. There were approximately twice as many calls in 1920 as in 1928, although the registration at the Appointments Office was one-third larger in 1928 than in 1920.

Superintendents of schools and teacher-placing agencies report an increasing oversupply of high-school teachers in California, Kansas, Washington, Ohio, and New York. School officials who secured high-school teachers with difficulty in the years 1919-23 now report many eager applicants. While in certain combinations of subjects there is a definite shortage, in general, the need is for curtailment of output and for more definite efforts in careful and specific training for the actual duties of teaching.

Mr. Williams states that the fields of history, English, and Spanish are crowded. French and mathematics also have plenty of candidates. There is a demand for commercial teachers with college degrees, for teachers with combinations of general science and biology, chemistry and biology, physics and biology, home economics and biology, English and Latin, and for persons, especially men, trained in music. A strong demand for teachers who can teach a wide variety of subjects is not emphasized. Small high schools, however, require this "general" type of teacher.

Positions are not always filled by well-qualified teachers. Because of this fact "it seems desirable that the process of elimination be effective before graduation." This report giving definite evidence of oversupply in the high-school field should be of interest to all engaged in teacher training. The recommendations concerning the selection of candidates for teacher-training work and the elimination of the less fit from colleges of education are especially worthy of consideration.

ADAMS, JESSIE E. *A Study in the Equalization of Educational Opportunities in Kentucky.* Lexington, Kentucky, University of Kentucky, n.d. 268 pp. (Bulletin of the University of Kentucky)

The thesis that educational opportunities cannot be equalized until the nature and the amount of these inequalities is more definitely known serves as the basis for this study. Among the inequalities shown by counties in the state are those relating to the holding power of Kentucky High Schools, aggregate days of attendance, percent of illiteracy, training and experience of teachers, various angles of school costs, the ability to support public education, and the financial burden imposed by such support. From the vast amount of material assembled in the study three plans, the first two of which are cumulative, are set up as means of partially overcoming these inequalities.

The first plan is built on a minimum education program of eight-months school with a teacher cost of nine hundred dollars plus three hundred dollars for other current expenditures. This twelve hundred dollars is then applied to the total number of teachers in the county, giving the minimum cost of the educational program. Such portion of this cost as will not be raised by a uniform local tax of thirty-nine cents

per one hundred dollars of taxable wealth and the present state-aid program is to be furnished by the state. As a means of raising the additional seven million dollars needed, the following sources are proposed: personal income tax, business tax, tax on retail tobacco sales, ad valorem on mining property, and a theater tax. The rates necessary to raise the amount needed have also been worked out.

The second plan, which includes the first, sets up a program of state aid for capital outlay by counties. This is built on the basis of an annual capital outlay equal to ninety dollars per teacher, which amount is equivalent to a 3 percent depreciation on school building. In this plan each district levies a uniform tax of eight cents per one hundred dollars of taxable wealth for capital outlay purposes, and the difference between the amount raised by this tax and the ninety dollars per teacher is to be contributed by the state.

The third plan is similar to the first except that it is based on a fifty cent levy instead of a thirty-nine cent levy, thereby considerably reducing the amount of state aid needed for the minimum education program. The study is a comprehensive analysis of the educational system of the state, and should serve as a basis for a program of educational equalization.

BOOKS TO READ

ROBERTS, ALEXANDER CRIPPEN AND DRAPER, EDGAR MARIAN. *Extra-Class and Intramural Activities in High Schools.* New York: D. C. Heath and Company, 1928. xvii + 529 pp.

This book is a compilation of the extra-curricular activities in practise in our schools today, and contains much of interest to those who are concerned with the study of this field as an educational problem. An attempt is made not only to justify the existence of this part of our educational program, but also to show the opportunities for real education which this field presents.

The materials used in making this study of extra-curricular activities have been drawn from three sources, (1) the book and magazine literature available on the subject, (2) the results of a carefully planned questionnaire study, and (3) the personal experience of the authors as high-school teachers, coaches, and principals.

As a part of their educational philosophy the writers set forth the belief that "the schools are society's agents for the integration of all the forces of training for more effective citizenship." An attempt is made to clarify the interrelation of American democracy, the American high school and the extra-curricular activities. The philosophy which underlies the whole production is that there is justification for the extra-curricular program because "it is much more essential for boys and girls to do things in a certain way than to have those things eulogized as worthy, or to see them done by others." The extra-curricular program is a practical working-out of the idea that character and citizenship are the results of performance.

W. K. WILSON

EVERETT, JOHN P. *The Fundamental Skills of Algebra.* New York: Teachers College, Columbia University, 1928. vi + 109 pp. (Teachers College, Columbia University, Contributions to Education, No. 324)

"It is not so much *abstractions* that differentiate algebra from arithmetic as it is the element of *generality*." The fundamental skills of algebra are of two sorts, the manipulative skills and the association skills. The first include the skills of addition, subtraction, multiplication, and division. The second group, the associative skills, include skills of interpretation, that is the use of symbols for quantities; and the skills of relation, knowing the interrelationships implied by various equations. In general, the teaching of algebra would be more successful if more emphasis were placed on the associative skills, not by mere problem solving, but by discussing more the implications of the problems solved.

HAROLD A. EDGERTON

FRIESE, JOHN F. *The Cosmopolitan Evening School.* New York: The Century Company, 1929. xvi + 388 pp.

From his rich experience Mr. Friese has given a comprehensive discussion of the organization and administration of evening schools. The strength and weakness of adult education as it is at present conducted is indicated in such a way that the future problems in this field are apparent to the interested student. Every phase of evening-school education is discussed: the nature, objectives, and possibilities of the evening school, its organization, administration, curriculum, the teachers and their training, and the methods of teaching applicable to adult interests and capabilities.

The questions, problems, and references at the close of each chapter are direct and stimulating. The text is supplemented by illustrations of forms, records and reports, courses of study, and advertising samples. In addition Appendix B is devoted to complete sets of administrative forms. Appendix A contains extracts from the report of the committee on Adult Education and the American Vocational Association. This report sets forth in brief, concise form the educational principles underlying adult education, the conditions and difficulties to be met, the methods

to be used in solving them and the recommendations of the committee.

The book will be helpful to the student of evening-school education in presenting information and in pointing to problems to be solved. For the person who wishes to become acquainted with the present trend in adult education, Mr. Friese has contributed a book which is authentic, interesting, and informational.

ENID W. LUNN

Our Contributors

R. L. Morton of Ohio University needs no introduction to the readers of the Bulletin. Many will recall Mr. Morton's articles on arithmetic which appeared while he was a graduate student at Ohio State University.

To our personal regret we now announce that E. J. Ashbaugh is Dean of the College of Education, Miami University, and is no longer Assistant Director of the Bureau of Educational Research.

Readers of the Bulletin will welcome the article by B. R. Buckingham, sometime editor of the Bulletin, now of the editorial offices of Ginn and Company and Harvard Graduate School.

* * *

Felix Payant, professor in the Department of Fine Arts, Ohio State University, has recently acquired the management and editorship of *Design*, a monthly magazine devoted to art education, design, and the crafts. The publication is particularly well known to teachers of art in high schools, normal schools, art schools, and colleges. The articles are illustrated by half-tone and color reproductions of the work of outstanding artists and craftsmen. Articles by teachers of art, often illustrated by the work of their classes, give the readers an insight into design in the making. The magazine aims also to bring to teachers who do not have access to museums, selected material from which they may draw inspiration for class work. Since design plays an important part in our education, and places such a high premium on creative ability, this magazine tries to discuss as many of the different phases of design as possible. Ceramics, theatrical art, block printing, lettering, textiles, costumes, and interior decoration are treated.

The magazine, published in Syracuse, was started as the *Keramic Studio* in 1899 by Mrs. Adelaide Alsop Robineau, whom the Metropolitan Museum has termed the "leader in American ceramics." She is the first person in this country to produce porcelains whose work is now exhibited in the Metropolitan and other leading American museums. The magazine has always followed the development of ceramic art and with the importance which this has in the contemporary movement it will continue to be well represented. *Design* in the future will strive not only to be the official organ of those interested in art education from the standpoint of design but also to appeal to the large and growing group of ceramic artists and to craftsmen in all lines.

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Mrs. Winifred Hathaway, Associate Director of the National Society for the Prevention of Blindness, has very kindly drawn our attention to a misuse of the word "optician" on page 199 of the *Educational Research Bulletin* dated May 1 of this year. We should have used "oculist" in this context.